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ABSTRACT

Two automated teaching systems were evaluated in Alaska to indicate the problems and benefits derived from modern educational technology in two rural schools (Tanana State School and Nenana City School) and an urban career center (the Adult Career Development Center) during the 1973-74 school year. Interviews, questionnaires, and classroom observations were used to collect data on this teaching method compared to others and the applicability of this approach to rural students. Teacher and student attitudes toward automated teaching as an alternative were reflected in the answers. The benefits of automated teaching were that automated instruction provided an alternative way of teaching; it was an innovative approach that motivated low achievers, and offered the multisensory stimulation, repetition, and/or drill needed by some students. Individualized, as well as limited group instruction, freed the teacher to help in areas most needed. The skills being taught were well planned to expose the student thoroughly to that area and content relevant to his interests. The biggest problems faced were breakdown of equipment and time spent for coordination of audio to visual. The financial expense of programs and machines was not closely examined since equipment was donated for the use during the school year, but when planning for rural education, all costs and benefits should be examined closely to find out if automated teaching is effective in meeting rural students' needs for a reasonable expenditure. (NQ)

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EVALUATION OF AUTOMATED TEACHING SYSTEMS IN THREE ALASKAN SCHOOLS

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(Cover features Stanley Starr with the Dart Small Engine Program in Nenana High School)

Abstract

The trend in Alaskan education toward small village or area high schools offers an opportunity to examine new educational technology for effectively meeting the needs of the rural student. This evaluation of two automated teaching systems was designed to indicate to the Department of Education the problems and benefits derived from modern educational technology in two selected rural schools and one selected urban career center. This study describes what occurred during the 1973-74 school year in Tanana State School, Nenana City School, and the Adult Career Development Center in Fairbanks with automated teaching systems.

Interviews, questionnaires, and classroom observation were used to answer such questions as how this method of teaching seemed to compare to other methods and if this approach is applicable to rural students. Teacher and student attitudes toward automated teaching as an alternative are reflected in the answers.

The benefits of automated teaching in the three sites seem to be that automated instruction provides an alternative way of teaching; it is an innovative approach that motivates low achievers, offers multi-sensory stimulation, and repetition or drill needed by some students. Individualized, as well as limited group instruction frees the teacher to help in areas most needed. In addition, the skills being taught have been well planned to expose the student thoroughly to that area. The attention of the students at these sites indicated that the content is relevant to their interests.

The biggest problems faced were breakdown of equipment and the time spent for coordination of audio to visual. These problems resulted in one teacher stating that the automated system seemed to be too unreliable for daily classroom planning and use. Other instructors felt that if equipment breakdown could be minimized by improving the mechanisms or turn-over time shortened by providing local repair personnel, daily planning and coursework could utilize this alternative method effectively.

The financial expense of programs and machines was not closely examined since equipment was donated for the use during the school year, but when planning for rural education, all costs and benefits should be examined closely to find out if automated teaching is effective in meeting rural students needs for a reasonable expenditure.

PREFACE

New and unique teaching methods for Alaska's rural students have been sought as a means of improving students' interest and participation in educational activities. One innovative approach is the inclusion of the "multi-sensory" method through automated teaching systems or "teaching machines." Automated teaching systems have been reported to be consistently effective in technological training programs for adults in industry, but have yet to be evaluated in Alaska's rural schools for teenagers in academic subjects and job training.

The Center for Northern Educational Research, because of its interest in the development and field testing of innovative educational approaches, especially for rural education in Alaska, was asked to evaluate two such automated teaching systems. With the increased trend for rural students to attend high school in or near their home towns, few teachers and small communities could limit curriculum and teaching methods available to the smaller high schools. Automated teaching systems offer new educational technology in the form of teaching machines which may increase the methods and broaden the subject matter available for the individual needs of the student.

The support for this research came through the Alaska Department of Education and the two sponsors of the automated systems, the Ken Cook Company and the Tomahawk Corporation. The Department of Education funded the research through a grant to the Center for Northern Educational Research. Support from the company sponsors was through provision of the teaching machines, programs, and student materials for the school year, 1973-74.

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Diana Holzmueller

TABLE OF CONTENTS

	Page
Introduction	1
Purpose	1
Method	2
Site Selection	3
Description of Automated Teaching Systems	4
Program Description by Site	8
Conclusions	24
Appendix I, Ken Cook Automated Teaching System	28
Appendix II, Tomahawk Corporation Automated Teaching System	39
Appendix III, Achievement Scores	48
Appendix IV, Interview and Daily Record Forms	53
Appendix V, Individual Contracts and Weekly Evaluation	61
Appendix VI, Sponsor Comments on Evaluation	67

INTRODUCTION

Small rural high schools are becoming increasingly popular in Alaska because of parental pressure for their children to remain home and because of the increasing evidence that large urban schools are not necessarily the answer to educating village students.[1] The trend toward smaller high schools offers an opportunity to demonstrate and field test new educational technology, such as automated teaching systems for effectively meeting the individual needs of the rural student by offering a wider variety of courses in his home high school. Sponsors of two such systems, the Ken Cook Company and the Tomahawk Corporation, believe that their systems can meet these needs by offering an innovative approach to such areas as Basic Communications, Personal Finance, and Small Engine Technology for high school students and adults. Each system has its own characteristics in terms of the program length, type of curriculum, and mechanics of the machine.

PURPOSE

This study evaluates the problems and benefits of using automated teaching systems in educational settings in Alaska. It attempts to describe what really happens in different schools, with varied curriculum and different conditions in terms of administration and physical surroundings. Do the students really learn what the programs say they will teach or are they only interested because it's a new and innovative system? Is this approach

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[1]Judith Kleinfeld. *A Long Way from Home: Effects of Public High Schools on Village Children Away from Home*. Center for Northern Educational Research and Institute of Social, Economic, and Government Research, 1973.

applicable to different cultural groups? How does this method of teaching compare to other ways? What are the problems of rural schools with modern technology? These questions and others unique to the educational environment were examined to assist the Department of Education in determining if the automated teaching systems can be used effectively in rural areas.

METHOD

Specific locations for installation of the automated teaching systems or teaching machines were decided upon by the criteria of (1) proximity to Fairbanks in order to reduce travel costs; (2) fulfillment of evaluation specifications; and (3) administrative cooperation.

Initially, two sites having an Adult Basic Education program (ABE) or General Education Diploma program (GED) and high school program were to be selected. One site would be located in a predominantly rural Native population and the other in a predominantly white urban population to provide a basis for comparison. However, since an additional sponsor wanted to have programs evaluated in a rural environment, and with all criteria not available, an additional site was added that involved only a high school program.

Evaluation of preference for the programmed materials by teachers and students was done through interviews, questionnaires, and classroom observation during the 1973-74 school year.

The Adult Career and Development Center - Hutchison Vocational Educational Building in Fairbanks, Alaska. The Adult Career and Development Center (ACDC) in Fairbanks was selected for the Basic Communications Series of programmed materials (Ken Cook Company) because of its predominantly urban-white population, location, and the programs of Adult Basic Education and General Education Diploma classes offered to high school dropouts and adults. The ACDC opened in Fairbanks in September, 1973, for these classes. Initially there were going to be approximately 30 students in these classes for individualized teaching in the basic subjects of reading, composition, science, and arithmetic. Other programs in the building include vocational and technical courses for students who are enrolled part time at the high school and for persons taking only these specific courses. ACDC is unique in that it is one of the few places in the United States which offers training for enrolled high school students and adults intermixed in the same class.

Tanana State School in Tanana, Alaska. Tanana was selected for the Basic Communications Series the second half of the school year because of its predominantly rural-Native population and proximity to Fairbanks. It also has a State-Operated High School that draws students from neighboring smaller villages, making the high school population about 80. The administration is very open to innovative ideas and the school curriculum offers individual teaching in some classes. Another consideration was that a student in ARTTC (Alaska Rural Teacher Training Corps) was involved in community activities and was interested in be-

ginning an adult program in the evening using the Basic Communication Series in the school library.

Nenana City Schools in Nenana, Alaska. Nenana was selected for a variety of programs sponsored by the Tomahawk Corporation: Small Engines, Personal Finance, IBM Keypunch, and 10-Key Adding Machine. It was selected for its proximity to Fairbanks, diverse high school population, and individualized teaching methods being employed. There are approximately 60 high school students. Since the Tomahawk Corporation representative planned to have the programs and equipment in Alaska only the second half of the school year, no comparison site was selected.

DESCRIPTION OF AUTOMATED TEACHING SYSTEMS

The Ken Cook Company, Basic Communication Series is a learning system that "has been developed with the principal intention of promoting an English literacy level of performance adequate to insure employment success in entry-level job positions. Concurrent with and accomplished through the literacy training experience, *Basic Communications* also furthers the learner's vocational and social adjustment. Reading vocabulary, narratives, and written responses concentrate on occupational information, tools of the trades, job procurement, adjustment to the world of work, and managing personal earnings in the consumer marketplace."[2]

The materials are geared for the adolescent and adult nonreader and marginal reader, specifically the young adult male. These programs have been said by the sponsor to be successful in community colleges, penal

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[2]*Instructor's Guide, Basic Communications.* Ken Cook Transnational, 1972.

institutions, and special technical or vocational programs in other states. One other educational institution in Alaska using the Basic Communication Series currently is Kodiak Island Borough School District. No statistical data or written information was available for comparison at the time this report was written.

The main parts of this learning system are the programs which include a tape for the audio, a set of slides for the visual, an individual projector for viewing them, and student materials to respond on. The teacher or manager also has a manual showing the slides that go along with the questions and a guide for suggested entry level. Appendix I gives a synopsis of programs in each of the series' levels and indicates what the actual "teaching" machine, the Mark 9, looks like. There are four levels: Basic Reading, Selecting a Trade, Full-Time Employment, and Consumer Affairs. In addition, there are reviews and tests for the student to take and an automatic rewind for the tapes.

At the beginning and middle of the year, a representative from the Ken Cook Company directed a workshop for the teachers involved. During that time, introduction to the programs, mechanics of the system, and how to operate the machines were explained. The Adult Career Development Center and Tanana both had the advantage of being involved with the teaching system in Small Engines training. However, this was to be an experimental program for using the *Basic Communications* within the confines of the public school, with the restricted time element and with the younger high school students (12-13 years old).

The Tomahawk Corporation is a sponsor for the Dart programs and Cardinal machines. These two separate items are put together in a single package for automated teaching. The Tomahawk Corporation became interested in finding out how their programs would do in rural Alaskan schools when they found out that they could supply the equipment and programs for an evaluation. Their programs have been expressly developed for high school students, mainly for vocational and technical training. Each program is complete in itself. A brief guide to each program is supplied to the instructor for use with the individual programs. How these guides are used is left up to the instructor.

Appendix II pictures what the main parts of this learning system are. These include the machine, a single cassette that contains a film loop and tape recording, and additional student materials. A foot pedal and pacer for speed drills were also available for the students. The student materials in these programs included the Olivetti 10-key adding machine for use with the programs, a small gasoline engine that ran when assembled, and the tools to assemble and disassemble it.

At mid-year, a representative from the Tomahawk Corporation directed a workshop for the teachers involved. During that time, introduction to the machines, programs available, and how to operate the system were explained. Some of the programs that the teachers requested were not available at that time. Two different areas of concentration for the programs were decided on, business and small engines' technology.

ACHIEVEMENT AND ATTITUDE

In each of the three educational environments, achievement was measured by a different instrument. These were varied because of the different physical environment, administration, curriculum, and time span. Thus, achievement is not statistically compared between environments, but individually examined.

The attitude of students and teachers was indicated through questionnaires and interviews that were as parallel as possible. Student attitudes examined included their response to automated learning systems in general, as well as to the specific programmed materials they were involved with. Teachers' attitudes were also observed in these two areas as well. Anecdotal records and classroom observations provided additional information.

No specifc attempt was made to analyze the quality of the teaching systems except as it pertained to individual classroom use. For example, the mechanics of the machines or wording of the programs for use in rural schools was not formally judged.

PROGRAM DESCRIPTION
BY SITE

The Adult Career and Development Center - Hutchison Vocational Building, Fairbanks

In September, 1973, approximately 15-20 students were enrolled to take Adult Basic Education or General Education Diploma courses at the Adult Career and Development Center. A specific number could not be determined by the teachers because students would sign up, appear once or twice, and then drop the classes. The 30 students initially indicated to be in these classes never materialized. One reason for enrollment drop was thought to be that tuition had to be paid for these classes and there were free classes being taught through the Native Community Center. Another reason was that there were classes being taught at Fort Wainwright, an Army base on the other side of Fairbanks. A third reason for the small number of students might have been the "open-entry, open-exit" policy in these academic courses. Students were able to enter and leave the classes at any point in time or any level of achievement. For these reasons, only 11 students were available to take the California Reading Achievement Test to measure initial reading achievement grade level. Blacks, Natives, and Caucasians were represented in those tested. There were 2 males and 9 females whose ages ranged from 17 to 50. A second form of the test would be given at the end of the semester to measure achievement in reading over the specified time. These scores would help to indicate the effects on reading level of using the *Basic Communications* series.

Students in both the ABE and GED courses were together in a single room for individualized instruction. One teacher taught English (literature

and composition) and arithmetic. Another taught science; basic reading skills, such as spelling; and miscellaneous individualized, elective subjects, such as penmanship. Later in the semester, this teacher was requested to teach at Fort Wainwright because they needed an instructor and enrollment in the classes did not warrant two teachers. Some materials were geared for those students taking basic education, others were geared toward the completion of the GED. Testing for the GED occurred monthly and the student could request to take the test when he felt prepared for it, usually at the instructor's recommendation after certain texts and materials had been covered. For these reasons, initial reading achievement level varied considerably. Scores on the total reading grade level varied from 3.2 to 11.1 (see Appendix III).

About 45% of the students tested had reading achievement levels below the sixth grade. The remaining students had scores indicating they read better than the eighth grade level. According to the *Instructor's Guide* for success with *Basic Communications*, reading grade level should be at or below the sixth grade. Figure 1 suggests directions for student selection and entry level.

Figure 1*

Selecting the Student

In deciding how a disadvantaged adolescent or adult reader may benefit from the *Basic Communications* learning system, the instructor may follow one or more of these determinants:

1. Consult recent test or performance records, if available.
2. Conduct an informal interview; simple demonstration may substantiate complete or nearly complete illiteracy.
3. Administer a standardized reading test to determine approximate placement.
4. Administer Program 27 of Series I - *Basic Reading* - at the outset. This is a comprehensive review test of the first series. The student's performance level may indicate whether a complete or selective use of Series One is advised or whether a subsequent series should be the point of departure.

Student Entry Level	Recommended *Basic Communications* Series
Totally illiterate	I, II, III, and IV
Reading grade level under 3.0	I, II, III, and IV
Reading grade level - 3.0 to 4.0	
Evident weakness in word analysis skills	I, II, III, and IV
Reasonably strong in word analysis skills	II, III, and IV
Reading grade level - 4. - to 4.9	III and IV
Reading grade level - 5.0 to 6.0	IV

**Instructor's Guide, Basic Communications.* Ken Cook Transnational, 1972, p. 19.

Since only 5 of the students in the class had reading grade levels below the sixth grade, the instructor assigned those students with the higher levels of reading achievement to view at least 2 programs of their choice in Series IV - Consumer Affairs. Those students with the lower grade levels of reading were assigned to their correct entry level.

One very limiting factor in this particular site was the time the student had in the classroom. The student spent either 2 or 3 hours in class daily, depending on his course work. Three machines were in the classroom for the fall semester. One student commented, "If I was here longer, I'd do more with the machine." Classes were held daily and the student had the option to come into class at 1:00 PM or 2:00 PM as long as he was consistent. Some students who were receiving monies from the state for vocational rehabilitation or employment training had to attend class for a specified number of hours per week to get paid. The time element limited students working with the *Basic Communications* because they were also expected to complete work in other subjects. The teacher also did not use only *Basic Communications* for reading, but assigned it as a supplement. After the entry level had been assigned, the student worked at his own pace. Recording the number of the program used and time spent on it was tallied on a sheet daily. Sometimes students forgot, but, in general, daily records were kept. The teacher also kept anecdotal records of her experience with students using the series (see Appendix IV).

Interviews with students and teachers were conducted at the end of the semester. However, at this point, only 3 of the original 11 students tested remained in class. Since the number of students was so small and

Basic Communications was only used as a supplement, it was decided that a second form of the California Reading Achievement test would not be given. Another factor aiding this decision was the variability in use of the series among the 3 remaining students. One student had used the programs consistently, while the other two had used them only intermittently over the semester.

Answers to questions from the student interviews (see Appendix IV) varied. For example, question number 2 asked about the areas *Basic Communications* had helped the student in. One student who was using programs in Series I - Basic Reading, felt he had been helped in "learning consonants and vowels." Another student who said *Basic Communications* was "good for people who have a hard time understanding" felt he had been helped with "pronunciation and sounds." A third student using Series IV - Consumer Affairs felt she had been helped in "making sentences and spelling."

One student reported difficulties in coordinating the tapes and slides, although the instructor reported that the majority of students participating had some problems with coordinating them at some time or another. All those questioned liked the teaching machine concept and did not offer any suggestions for improvements in the programs themselves. The instructor felt "programs presented in the first level (Series I - Basic Reading) could be presented in a faster pace." She indicated this meant the speed of presentation rather than a more advanced level of vocabulary. This would be especially important when the review programs were used diagnostically or for strengthening specific areas of weakness when the student was reading better than the third grade level. After initial instruction on the mechanics of the machine, students only needed help in rewinding the tapes or coordinating tapes with slides.

The teacher thought Automated Teaching Systems "would and do work." Only one student who dropped out of the class mid-semester seemed to do poorly with automated teaching. He needed personal contact to keep up his motivation and would cheat himself by moving ahead in the program before he answered the questions. Students did especially well in the programs if they were strongly self-motivated, for example, "if they feel they have trouble in that area." Teacher recommendations for general changes included: (1) having a tape counter to mark the tape on the machine and on the rewind, (2) have a faster pace for audio in Series I, and (3) have more three-choice answers "to keep the student involved."

In sum, Basic Communications fits nicely into the curriculum in classes in the Adult Career and Development Center for Adult Basic Education. Those students in General Education Diploma classes are generally above the sixth grade level of reading and the programs are too elementary for them. Individualized, self-paced teaching, allowed the student to work on his own once the intial entry level into the program was determined. The programs in the series seemed to teach what they said they would in the synopsis[3] and all but one student worked well with the automated teaching system.

One disadvantage for using this approach in this site is the time limitation. Students had other subject areas to attend to in the limited classroom time and did not have the opportunity to spend as much time with Basic Communications as is recommended for increasing reading achievement level. Had some of the programs been presented at a faster pace, students

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[3] *Instructor's Guide, Basic Communications*. Ken Cook Transnational, 1972, pp. 12-18.

could have completed them and not felt they were too slow. The biggest problem seemed to be in the mechanics of the system in coordinating the visual with the audio. Had there been some device for marking the audio recording, most of the mechanical difficulties would have been solved.

Tanana State School, Tanana

High School

In January, 1974, the Ken Cook Automated Teaching System was moved to Tanana, Alaska. Tanana is a predominantly Athabascan Indian community approximately 175 miles northwest of Fairbanks. Travel to Tanana is limited to boat and airplane in the summer and airplane only, in the winter. It has between 400-450 inhabitants year-round.

The automated teaching system was used by the Special Education teacher to motivate students in the high school with low reading levels. In addition to teaching remedial courses, the teacher also taught a class in health education and individualized mathematics. The machines in the public school were an experimental project in finding out how students in a rural school setting reacted to this approach compared to those in urban educational environments.

The Gilmore Oral Reading test was administered by the teacher to 15 students. Eight others who used the automated teaching system were not tested. The Gilmore Oral Reading test was recommended by a school administrator because of its individualized nature and because it could be given by the teacher when a student started in *Basic Communications*. It was felt that the California Reading Achievement test was too long, too culturally biased, and the students were "tested out" since they had

just taken an achievement series prescribed for all State-Operated Schools. Only Native students were represented in those tested. Students' ages ranged from 12 to 20 and were in grades 7 to 12. A second form of the test was given at the end of the semester to measure change over the four-month period (see Appendix III).

All students in the high school receiving individual tutoring in reading had the opportunity to use *Basic Communications*. The school building was arranged so that the automated teaching system was set up on a special table in a carpeted room along with other reading materials. Students using the machines could come into class, choose the program that they were working on from the shelves, and begin work. The instructor assigned the initial entry level and left it up to the student to work at his own pace. One administrator showed concern over the lack of supervision of the students. He felt that less "abuse" of the machines and programs would have occurred had the teacher been more rigorous in her presence in the class.

One group of students attended class in the afternoon as a group. The teacher arranged a contract to motivate them (see Appendix V). Also, since there were only four machines, alternatives were needed for the rest of the students. With the contract teaching, the students not only had alternatives, but could adjust their own grade by the amount of work they accomplished. Weekly self-evaluations made the students aware of progress that week so that they could determine what materials still needed to be covered. In addition, the alternatives provided a means of comparing the *Basic Communications* with other innovative reading programs for this

age group. The teacher constructed a questionnaire for the students to rate the various materials used. Of the students polled, the majority consistently rated *Basic Communications* as "good" (see Appendix V). Students' rating of the alternative reading methods were tallied by the instructor (see Appendix V). While student response may not truly reflect the knowledge they gained, it does indicate their interest in the method and content of instruction. The teacher also felt that *Basic Communications* had a more thorough program for teaching basic skills than the other materials. One comment was that she thought a multi-sensory approach was definitely needed for some of her students. For those with very low skill levels, even back-up materials were needed. None of the students wanted to view a program a second time, so repetition of the skill through drills and other approaches had to be done with different materials. She reported, "one student has never learned to read in school. Ken Cook materials are the first thing he's shown interest in, except art and drawing. Finding a Job (Series III - Full Time Employment was of interest to all the students."

Besides using the materials individually, the instructor used some programs with groups. For example in mathematics, Series IV - Consumer Affairs, was used to acquaint the student with the vocabulary he would need and the problems he would cope with in budgeting money. Programs 1 and 2, Managing Your Money and Taxes were favorites. Programs 4 and 5, Shelter and Clothing were less relevant because types of houses and clothing are dictated by weather conditions, practicality, village tradition, and availability in rural Alaska.

Interviews with the students brought out problems they were having with the machines. Of the students available at the time, all reported difficulties with the mechanics of the system. The most serious was the problem in coordinating slides and tapes. By the time they had everything coordinated and ready to view, usually with help from the instructor, there was not enough time left to get the student really involved in the program. Personal observation indicated that those students not receiving help often had the wrong slide with the sound. Other mechanical problems they encountered included the earphones not working, slides jamming, light bulbs burning out frequently, and overall breakdown. Only two students had complaints about the programs. One said, "The man talks too slowly," Another commented that he had difficulties with "some of the words; (the program) didn't explain them good enough."

Recommendations from the instructor for improving the automated system for use in public schools included: (1) printing the slide number on the face of each slide so it showed with the picture, (2) a counter device on the tape, (3) a rewind system built into the machine, and (4) shortening program length to fit the concentration span and classroom time of the high school student. She also felt that the high breakdown rate of the mechanisms was detrimental to her class because the system was not reliable enough to be depended upon for daily use. Two of the originally four operational machines were in use at the end of the semester, and the slide mechanism consistently jammed in one of them.

In sum, *Basic Communications* is a good motivator for students in remedial reading programs in high school. The content and innovative

method keep the student interested and the total course offers good skill teaching for low reading levels. Statistical comparison cannot be made for the achievement over the semester because students were involved with the series for varying lengths of time.

Basic Communications is also excellent for introducing vocabulary in other subject areas such as in mathematics for money management or figuring taxes. The specialized vocabulary and examples are introduced so the student can cope with these problems on his own when they come up.[4] Students can work at their own pace in individualized teaching and the multi-sensory approach is needed for many students with low reading levels.

The problems with the mechanics of the machine had a detrimental effect. All students interviewed reported difficulties in coordinating slides and tapes. Some students who did not have the teachers' help would view incorrect pictures with the sound. Other mechanical failures, such as slides consistently jamming, earphones not working, and high breakdown rate caused the instructor to believe this automated teaching system to be unreliable for classroom teaching.

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[4]Some rural students have summer jobs, such as fire-fighting, in which they receive money in a large lump sum and have annual income taxes to file. Rural students have been exposed to taxes only in recent years and often have to teach their parents about them.

Adult Program

A University of Alaska student in ARTTC (Alaskan Rural Teacher Training Corps) was involved in getting community members interested in the school library in the evenings. It was thought that *Basic Communications* would be a unique way for some of the adults who have a limited reading ability to improve their efficiency. Five to six adults wanted to begin working with the programs but were afraid to be tested and would not commit themselves to any specific time when the instructor could be around to supervise. Most of those who wanted to view the programs fish and trap for a living. Trapping might take them away from the village for more than a week at a time so they were reluctant to start. Therefore, an adult reading program did not originate.

Nenana City Schools, Nenana

In January, 1974, the Tomahawk Corporation Automated Teaching System was placed in Nenana. Nenana has a large school population of Native students and the majority of all families do not have incomes that equal the state average.[5] Income is based mainly on lumber, the barge that operates in the summer, and a small tourist trade. Nenana is approximately 60 miles southwest of Fairbanks on the highway that continues down to Anchorage. The high school population has fallen to about 60 since a new school was opened up about 40 miles further down the road for Anderson Air Force Base.

The automated teaching system was used by the business teacher and by the shop instructor. These instructors were also responsible for other

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[5]Interview, Mr. Gene Harmelink, April 8, 1974.

classes. For example, the business teacher had a rural work program for some students that took him into Fairbanks fairly often, and the shop instructor taught chemistry. Since the programs were designed for high school students, the experimental program would help determine if they would be successful in rural education in Alaska.

No pre-testing of the students was required, however, the sponsor of the programs indicated that the success of the student often depended on how much exposure to the program area the student had previously had. It was felt that if the student had some experience, the programs would be too elementary. Students were requested to fill out a questionnaire before they started a program to find out if they had any previous exposure, and if so, what they knew about the subject area (see example, Appendix IV).

Each instructor had one projector to work with. The shop teacher had the Small Gasoline Engine Disassembly and Small Gasoline Engine Assembly programs. Five students in the Small Engines class completed the program. Interviews with the students indicated that it took them 5-6 days, one period per day to complete both programs. All of the students liked this method of teaching and the fact that a small Briggs and Stratton Engine was provided that went along with program helped them know exactly what the names of the engine parts were and where they were located. One girl who went through the program commented, "Everything had a place. I learned new parts, and what they were for." This particular program had tools and a plastic parts layout sheet that outlined the engine part that was supposed to go on it. Three of the five students reported

that they only needed the instructor for help in setting the points and adjusting the carburator on the engine. Otherwise, they worked by themselves and had no difficulties.

None of the students had used an automated teaching machine and were most impressed in using "sight and hearing, rather than reading." The engine, when assembled correctly, also ran. The instructor liked the fact that the program followed the procedure used by the Briggs and Stratton manual for small engines.

Comments by the teacher included the fact that more students could have used this program at the beginning of the year since many of them were in their second semester of small engines and some of the content had already been covered. This engine type was a good starting point and covered all the correct procedures, but it wasn't found much in town. "The two-cycle engine is used more for snowmobiles and outboard engines." Students went over the objectives individually after they completed each program. They were not written or orally administered as an exam by the teacher. A request for a rotary engine program was not answered although the sponsor originally indicated that he could supply it. The instructor also indicated a desire for programs in woodworking that might cover some of the power tolls such as a Skil Saw or a Router.

The business teacher had individualized teaching in all of his classes. Since he was gone approximately two days of the week to Fairbanks to supervise a rural student work program, he felt the students needed to be self-paced from the beginning to allow teaching consistency throughout the year in his classes. Since he did individualize, he could offer a wider curriculum that included Typing, Shorthand, Record Keeping, Accounting, Business Law,

Introduction to Office Practice, Simulated Office Practice, General Business, and Business Machines. He initially had trouble with the projector and it had to be replaced twice over the semester.

The instructor recevied a Personal Finance series of eight programs, a 10-key Olivetti adding machine and program, speed drills for the adding machine, and an IBM keypunch program that came late in the semester.

The replacement of the machine was a detriment because he could not use the programs until he had the machine; therefore, not many students had the opportunity to view the programs. Only four students worked on programs. One student went through the entire Personal Finance series of programs. The objectives stated were given as a test by the teacher at the end of each program completed. An interview with the student at the end of the semester indicated that she "liked the programs; they were good for high school students who didn't like to read directions. I wish they had one in accounting." Another student who had experience on the 10-key adding machine felt she had gained a lot of experience in working with the speed drills. One student, who was absent at the time of the interviews, was working on the IBM keypunch program, and according to the teacher "she was working right along."

Only one student who began a program quit using the automated teaching system. The student had indicated no previous experience with the 10-key adding machine on her initial questionnaire. The instructor said, "She acted like she was being talked down to when the program started out by explaining how to plug in the cord." This student quit school during the semester.

According to the teacher and interviews with the students, they did not have too much trouble adjusting and focusing the machine, but if for some reason the machine broke down, there was valuable time spent in replacing the machine. During the workshop, the sponsor had asked the instructors not to try to repair the machines themselves, but to send them back for replacement.

In sum, the students who used the machines benefited by the content material and alternative way of presenting it. However, breakdown of the machines resulted in a loss of valuable time for students to use the programs. Both instructors approved the system for use in their individual subject areas.

CONCLUSIONS

Automated teaching systems in three individual sites with different programs and different teaching systems have produced similar results in terms of success and problems encountered. The most noticeable success is that the teaching system, with its multi-sensory approach of involving the student in choosing correct responses, along with audio and visual stimulation, motivates slow students and offers an alternative method for supplementary teaching.

Students with low reading grade levels, such as in Tanana and in the Adult Career Development Center, who are often "dropouts" from other educational environments, are highly motivated by the programs offered in *Basic Communications*. Vocabulary and skill building techniques are offered in content that is interesting and informative to the student. The material does not "talk down" to the student by offering elementary vocabulary, and content can be applied to everyday life in rural or urban environments, such as in finding a job or filing annual tax forms. In addition, the student can work independently at his own pace. The teacher may only be needed to help the student determine his entry level into the program and periodically examine the work the student has completed. Some of the programs in the more advanced series Full Time Employment and Consumer Affairs may be used to introduce new vocabulary to students in other subject areas. For example, arithmetic may cover such basic areas as taxes or budgeting money; automated teaching offers variety in the method of teaching as well as introduction to specialized vocabulary in the subject area.

In shop or technical courses where a "hands-on" approach is successful, programs offering equipment such as a small engine or a 10-key adding machine, help the student learn new parts in that specific machine that can be generalized to similar machinery. In rural areas, such as Nenana, the student may not come in contact with credit buying and applying for a long-term loan. Personal finance programs that actually supply "fake" credit cards and payment books offer incentive for students to learn correct procedures by actually following them. Students who are tired of getting information strictly from a text will be motivated by the audio and visual, especially when they receive immediate feedback. Programs that are individualized offer more expansion for the teacher to be involved with other duties or offer a wider selection of courses. Since teachers often have a varied workload in rural areas, as indicated by instructors in Nenana and Tanana, innovative materials and methods are needed so that they can keep all the students involved and offer assistance where it is needed most.

In two of the three sites, Fairbanks and Nenana, Caucasian and Black students also participated with Native students. Observation did not indicate any variability in the students' response. This indicates that automated teaching systems would be equally as effective with the various ethnic groups. Both males and females participated in all three sites. Direct observation and student response did not point out difference in interest because of sex.

The problems encountered in the two rural schools Nenana and Tanana, may also occur in other rural schools. The biggest problem seems to be the general breakdown rate of the equipment. This is costly, in terms of

both money to ship the machines to the factories for repair and student time lost because the machines are not operating. Daily use of the machines in rural schools would probably occur, but all indications are that neither system could hold up to such rigorous demands. High school students are probably a little harder on machines because they think they can fix the equipment themselves and may try to force or pull too hard on delicate machinery. Two solutions might be to have a "traveling repairman" who can come out and repair equipment immediately, or a local representative in Fairbanks or Anchorage to ship the machines. Both would save time, but may not be economically feasible.

Difficulties in coordinating the slides and tapes were the biggest complaint with the Ken Cook Company materials. Too much of the students' and teachers' time was spent on it. In most rural high schools where each daily classroom period is between 40-50 minutes, full benefit would not be gained if too much of the time was spent in adjusting the mechanics of the system.

Three main comments about individual programs in *Basic Communications* for use in Alaska public schools were noted, as follows:

(1) The first series, Basic Reading could be improved for students with higher levels of reading by offering tapes with a faster speech rate. This series is excellent for improving areas of weakness in basic skills, such as *ed* endings; however, the student with a third grade or higher level of reading is bored by the slowness of the speaker's voice and loses concentration.

(2) Shortened program length would decrease difficulties in rewinding and coordinating tapes and slides. If individual programs were geared for the 40-50 minute high school class length, one program per class period could be completed and adjustment of the tape to the matching slide would be cut to a minimum.

(3) Alternatives suggested in programs, such as Shelter and Clothing (Series IV - Consumer Affairs), are often not available to rural areas whose lifestyle is often dictated by the amount of subsistence food gathering, weather, practicality, availability, and tradition.

The one comment directed toward the technical programs, such as those in Nenana, was that previous exposure to a subject areas, such as in the example of the 10-key adding machine, may detract from the initial interest of the student and he would feel that the program is too elementary. Therefore, a survey of the students' knowledge of the area is highly recommended before he begins a program.

Automated teaching is an innovative way to offer individualized programs to students who need the variety of alternative teaching methods. The breakdown of machines and difficulties in coordinating tapes and slides may be costly in terms of money and student time and should be closely examined along with the benefits of the motivational factors for rural education.

APPENDIX I

Ken Cook Company Automated Teaching System

Basic Communications Program Synopsis

Fairbanks and Tanana

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BASIC COMMUNICATIONS - BASIC READING

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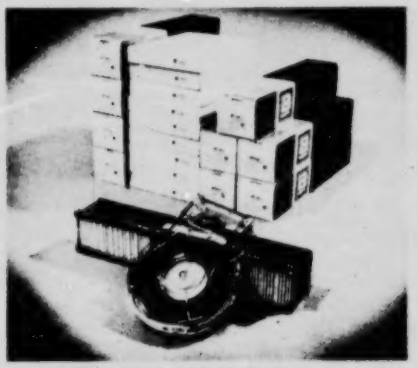
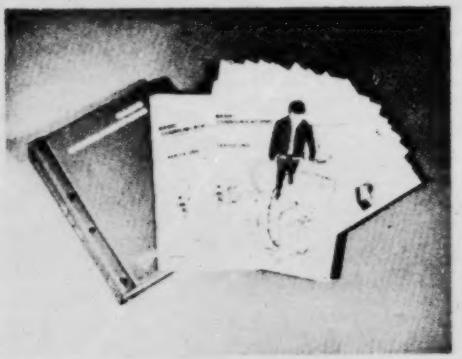
The Mark 9 accessories include a Console Screen and Mounting Plate for installation on a desk, carrel, or table. An individual headset provides student privacy.



The audio-visual training programs consist of individual plastic mounted slides in spill-proof magazines and four track student response tape cassettes.



Fifty workbooks and test sheets and an Instructor's Manual are included in the System. Additional expendable material can be ordered as required.

27 AUTOMATED TRAINING PROGRAMS

PROGRAM 1 – A, B, C - WORD BUILDING
Introducing the letters a, b, and c, introducing word building skills

PROGRAM 2 – D, E & CAPITALIZATION
Introducing the letters d and e, word building skills, and introducing capitalization of names

PROGRAM 3 – PLURAL FORM & PUNCTUATION
Introducing the reading and spelling of sight vocabulary, introducing sentence construction, forming the plural with "s", capitalization at the beginning of a sentence, and introduction of the period and question mark
Test 1 reviewing Programs 1, 2, and 3

PROGRAM 4 – F, G, H - SHORT A & E SOUND
Introducing the letters f, g, and h, word building skills, and discriminating between the short a and short e sounds

PROGRAM 5 – SIGHT WORDS - ADDING 'ED'
Introducing the reading and spelling of sight vocabulary, sentence construction, adding the suffix "ed", and introducing the rules for doubling the last letter of the word before adding "ed"
Test 2 reviewing Programs 4 and 5

PROGRAM 6 – I, J, K - COMMON ENDINGS
Introducing the letters i, j, and k, word building skills, discriminating between short a, e and i sounds, and the endings ck, ab, ad, ag, ig, and id

PROGRAM 7 – SIGHT VOCABULARY & REVIEW
Reading and spelling additional sight vocabulary, sentence building, and review of skills taught in Program 6
Test 3 reviewing Programs 6 and 7

PROGRAM 8 – L, M, N, O, & ENDINGS
Introducing the letters l, m, n, and o, word building skills, the endings: ock, ob, ill, an, and, end, and ond, and the suffixes: s, ed, and ing

BASIC COMMUNICATIONS

PROGRAM SYNOPSIS

SERIES ONE
BASIC READING

Program 1 - A, B, C Word Building
Introducing the letters a, b, and c; introducing word building skills.

Program 2 - D, E, and Capitalization
Introducing the letters d and e; word building skills; and introducing capitalization of names.

Program 3 - Plural Form and Punctuation
Introducing the reading and spelling of sight vocabulary; introducing sentence construction; forming the plural with "s"; capitalization at the beginning of a sentence; and introduction of the period and question mark. Test 1 reviewing Programs 1, 2, and 3.

Program 4 - F, G, H - Short A and E Sound
Introducing the letters f, g, and h; word building skills; and discriminating between the short a and short e sounds.

Program 5 - Sight Words - Adding "ED"
Introducing the reading and spelling of sight vocabulary, sentence construction, adding the suffix "ed", and introducing the rules for doubling the last letter of the word before adding "ed". Test 2 reviewing Programs 4 and 5.

Program 6 - I, J, K - Common Endings
Introducing the letters i, j, and k; word building skills; discriminating between short a, e, and i sounds; and the endings: ck, ab, ad, ag, ig, and id.

Program 7 - Sight Vocabulary and Review
Reading and spelling additional sight vocabulary, sentence building, and review of skills taught in Program 6. Test 3 reviewing Programs 6 and 7.

Program 8 - L, M, N, O, and Endings
Introducing the letters l, m, n, and o; word building skills; the endings: s, ed, and ing.

Program 9 - Sight Words - Syllabication
Reading and spelling more sight words; sentence building, introducing syllabication; and review of skills taught in Program 8. Test 4 reviewing Programs 8 and 9.

Program 10 - P, Q, R, S and Endings
Introducing the letters p, q, r, and s; word building skills; review of syllabication; the endings: ess and ness; and rules for doubling final letters when adding ing.

Program 11 - Sight Words - Their and There
Reading and spelling added sight words; contrasting their and there; and review skills taught in Programs 10 and 11. Test 5 reviewing Programs 10 and 11.

Program 12 - T, U, V, W, and Affixes
Introducing the letters t, u, v, and w; word building; the et and ound endings; the prefix: un; review of syllabication; the suffix er as a doer; the comparative suffixes: er and est; and rules for doubling final letters before adding the suffixes er and est.

Program 13 - Sight Words and Endings
Reading and spelling more sight words; sentence building; the endings: all, ow, ly and ook.

Program 14 - X, Three Sounds of Y and Z
Introducing the letters x, y as a consonant, and z; introducing the two vowel sounds of y; review of skills taught in Programs 12, 13 and 14. Test 6 reviewing Programs 12, 13 and 14.

Program 15 - A to Z Review
Review of letters a through z; review of syllabication, suffixes, comparative endings, capitalization, punctuation, and plurals. Test 7 reviewing Programs 1 through 14.

Program 16 - Vowels and Final E Rule
Introduction to vowels; word building; long and short vowel sounds; and final e rule.

Program 17 - Vowels and Double Vowels
Review of long and short vowel sounds; rules for sounding double vowels; syllables with double consonants; and ay and y as vowels.

Program 18 - Sight Words and Title Words
Reading and spelling sight words; capitalization and abbreviation of title words; sentence construction. Test 8 reviewing Programs 16, 17 and 18.

Program 19 - Digraphs and Silent Letters
Introducing the digraphs: th, wh, sh, ch, and tch; introducing the silent letter combinations: kn, wr, and ight; and word building exercises.

Program 20 - Vowels with R - ES Plurals
Sounding the vowels followed by r; forming plurals by adding es; and word building exercises.

Program 21 - Sight Words and Derivatives
Reading and spelling sight words; deriving new words through altering the sight words; and review of skills taught in Programs 19, 20 and 21. Test 9 reviewing Programs 19, 20, and 21.

Program 22 - SCHWA Sound and Suffixes
Introduction to double vowels: oi and oy; the endings: ment and tion; introduction to the schwa sound; and the suffixes: le, ous, able, and ive.

Program 23 - Y Endings - Soft C and G
Plural forms for words ending in y; introduction to soft c and g sounds; forming words with the suffixes: ment, able, less, ous, and ful; and adding suffixes to words ending with a silent e.

Program 24 - Sight Words and AW Sound
Reading and spelling more sight words; words with the aw sound; and review of skills taught in Programs 22, 23 and 24. Test 10 reviewing Programs 22, 23 and 24.

Program 25 - Contractions
Introduction to contractions; word building exercises involving contractions.

Program 26 - Basic Reading Review
Review of skills taught in entire first series of the course: Programs 1 through 25.

Program 27 - Basic Reading Final Test
Comprehensive review of test of the entire first series of the course; Programs 1 through 25.

SERIES TWO
SELECTING A TRADE

Program 1 - Introduction to Trades
The eight trades featured in the series are briefly previewed and surveyed.

Program 2 - The Appliance Serviceman
Sam progresses from the small appliance repair bench to the large appliance home repair visit to the sales floor.

Program 3 - The Baker
Bob learns the baking trade as he climbs the job ladder in a commercial bakery; later, he becomes a multi-purpose baker in a small home bakery.

Program 4 - The Barber
Besides learning barbering services, Ed finds out how to run a business in barber school.

Program 5 - The Bricklayer
Jim passes his entrance examination and experiences a well-rounded training program as a bricklayer apprentice.

Program 6 - The Iron Worker
Don discovers there are three types of iron workers; his apprenticeship lends chances to attempt all phases of the work.

Program 7 - The Machinist
Ron proves to the machine shop foreman that he is ready to handle set up as well as operation of the milling machine.

Program 8 - The Welder
A visit to the welding school helped Tom to decide if a welding career was the route for him to take.

Program 9 - The Orderly
Dave discovers the advantages and disadvantages of a health career as he learns the functions of a hospital orderly.

Program 10 - Review of Trades and Test
Similarities and differences in the eight trades are highlighted as the student performs a comprehensive review test.

SERIES THREE
FULL TIME EMPLOYMENT

Program 1 - Finding a Job
Helpful information is shared with the job hunter as he encounters reading tasks in using the want ad, the personal referral, the employment expert, and the "cold call".

Program 2 - The Application Form I
A step by step introduction is given to a typical brief application form.

Program 3 - The Application Form II
An individualized approach is featured as the student expands his working vocabulary through completion of an expanded application form.

Program 4 - The Job Interview
A job applicant considers the potential employer's expectations for personal preparation and decorum.

Program 5 - The Employee Handbook
A newly hired worker learns plant rules and regulations with the help of an employee handbook.

Program 6 - Employment Forms - W-4 Forms and Health Insurance
The newly hired employee is assisted with making important decisions concerning his tax exemptions and health insurance coverage.

Program 7 - Employment Forms - Credit Union and Social Security
Employee financial security plans are presented through introduction of credit union operations and Social Security.

Program 8 - Understanding the Fair Labor Standards Act
Basic principles of minimum wage, minimum hours, overtime pay, equal pay, and child labor laws are defined.

Program 9 - The Pay Check
Typical wage administration and pay computation practices are illustrated and explained.

Program 10 - The Employee Bulletin Board
Employer-employee and employee-employee communications provide the framework for building an understanding of organizational and social practices in the industrial setting.

SERIES FOUR
CONSUMER AFFAIRS

Program 1 - Managing Your Money
Explores the "why" and "how" of consumer budgeting for the benefit of the limited wage earner; translates patterns for aligning expenses with income in the learner's personal case.

Program 2 - Taxes
Surveys the impact of the various taxes on earnings and spending; lends tips for controlling and mitigating the individual's tax burden.

Program 3 - Food
Builds awareness of ways to check and stretch the food dollar and improve on nutrition in food selection.

Program 4 - Shelter
Enumerates options for selection of suitable private and government rental housing; surveys consumer dealings with utilities; excerpts basis tenant laws to clarify tenant/landlord rights and responsibilities.

Program 5 - Clothing
Sharpens buyers insight by introducing methods for interpreting and evaluating labels, materials, and workmanship; draws guidelines for establishing a basic budget male wardrobe.

Program 6 - Transportation
Investigates alternatives to automobile ownership; defines consumer checklists for the selection, purchase, and maintenance of used and new autos.

Program 7 - Medical Expenses
Defines alternative approaches to insuring for anticipated medical expenses; outlines programs for preventing medical expenses; alerts to free community health services.

Program 8 - Auto Insurance
Interprets driver responsibility laws; outlines types of automobile insurance desirable and applicable; alerts prospective car owner to techniques for shopping for auto insurance.

Program 9 - Life Insurance
Delineates types of life insurance and establishes priorities in selection for the young, family man.

Program 10 - Education and Recreation
Considers values of continuing education; searches avenues for finding satisfying, constructive, and inexpensive uses of leisure time.

Program 11 - Checking Account
Enumerates the values of the personal checking account as a money management tool; explains proper handling of negotiable instruments in relation to the orderly maintenance of the personal checking account.

Program 12 - Savings Account
Evaluates savings plans in the light of long term planning and credit buying; surveys alternatives in choosing a savings institution and savings plans.

Program 13 - Credit Buying
Explores the general principles of credit and the desirability of maintaining a favorable credit rating; scrutinizes alternative credit arrangements; alerts the consumer to advantages and pitfalls of credit buying; interprets "Truth-in-Lending" laws.

Program 14 - Large Item Credit Buying
Introduces the prospective automobile and large appliance buyer to the lending institutions and interest plans at his disposal; alerts prospective purchasers to the lender/borrower rights and responsibilities under the Consumer Credit Protection Act and related laws.

Program 15 - Small Item Credit Buying
Surveys charge account, charge card, and similar plans for retail store small credit purchases.

Program 16 - Consumer Protection
Alerts the naive householder to classic consumer enticements and frauds; outlines agencies and methods to obtain recourse in the event of exploitation.

APPENDIX II

Tomahawk Corporation Automated Teaching System

Personal Finance and Small Gasoline Engine Instructor's Guide

Nenana, Alaska

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THE DART®

AUTOTUTORIAL SYSTEM

FOR COMPLETE PROGRAMMED SELF-INSTRUCTION

CARDINAL ASSOCIATES, INC.

originators of the DART instructional system

INSTRUCTOR'S GUIDE
UNIT 3403

Personal Finance:
Keeping a Savings Account

Scope

This unit teaches what savings accounts are and how they operate. The student learns several definitions such as interest rate, compound interest, etc., how to choose the best method of saving for his particular needs, and how to decide where to save.

Target Population and Pre-requisites

This unit is designed for high school students who are performing satisfactory work at the eleventh grade level. The student must have successfully achieved the measurable objectives of Units 3401 and 3402.

Instructions

This is a self paced, individualized unit. The student should be encouraged to carry out the unit according to his own individual time requirements, taking breaks and/or stopping when he feels necessary. He should feel free to continue the lesson during another sitting or during another class period.

The instructions below should be followed prior to the student's taking this unit:

The programmed projector should be set up to the left of the student's work area where the student can see and hear the project clearly.

The front of the projector should be raised for easier viewing by the student.

The projector is designed for operation in well-lighted classrooms;

however, harsh lights or reflections should not be allowed to focus directly on the screen area.

All of the learning materials should be arranged neatly and within easy reach of the student. For maximum teaching effectiveness, the materials should be identical to those on the screen.

The unit should be cued and ready to start at the beginning of the lesson.*

Materials

The instructional materials necessary for the student to successfully complete this unit are as follows:

One PERSONAL FINANCE WORKBOOK
Several sheets of paper
Pencil

Should you have difficulty obtaining needed materials or replacement items, contact Cardinal Associates.

Measurable Objectives

The post-test is included in the unit beginning on frame 99. The questions and answers to this test are indicated below. .

(1) What are the three things you should have with you when you go to the bank to open a savings account?

a. Positive identification

b. Social Security card

c. Money

(2) What are the two main types of savings accounts?

a. Premium

b. Regular

---

*It is recommended and the instructor is encouraged to carry out each unit prior to offering it to the student.

(3) What is the main advantage of a premium account?
(Higher interest rate)

(4) What are the two main disadvantages of a premium account?

a. High initial deposit.

b. Restrictions on withdrawals, or words to that effect.

(5) What are the two main advantages of a regular account?

a. You can open an account with almost any amount you wish to deposit, or words to that effect.

b. Withdrawals can be made at any time.

(6) What is the main disadvantage of a regular account?

(Lower interest rate)

(7) What do each of the following symbols stand for?

a. WD (Withdrawal)

b. CR (Deposit)

c. IE (Interest Earned)

(8) What are the three main factors that affect the amount of interest you will receive?

a. Interest Rate

b. How often the interest is compounded, or words to that effect.

c. The amount of money you have in the bank.

(9) What are two things you should consider before deciding where to save?

a. Amount of interest you will receive

b. Convenience

c. Other services offered

(Any two)

(10) What is interest? (The amount the bank pays you for letting them keep your money, or words to that effect).

(11) What is meant by compounding interest? (The interest is added to the principal, or words to that effect).

INSTRUCTOR'S GUIDE
UNIT 3001

Small Gasoline Engine
Disassembly

One of a DART Mechanics Series

Scope

This instructional unit will teach the student the disassembly of a four cycle air-cooled engine such as is found on a typical lawn mower. While disassembling the Briggs and Stratton Model 92902 type 0515 engine, the student learns proper tool use and is introduced to the functions of each of the engine's parts. Prior to disassembly, the student is encouraged to start the engine to prove to himself that it runs.

Target Population and Prerequisites

This unit is designed for male and female students who are working satisfactorily at the seventh grade level of an accredited state public school system or its equivalent. The minimum age is thirteen years. The student should have the manual dexterity to change a tire on an autombile and the physical strength to lift the tire during such a changing operation. This unit is prerequisite to "Small Gasoline Engine: Assembly" (DART Unit 3002) which teaches the student to reassemble the dismantled engine.

Instructions

The instructions below should be carried out prior to the student's taking this unit:

The programmed projector should be located where the student can easily see and hear the projector while working on the engine.

The front of the projector should be raised for easier viewing by the student.

The project is designed for operation in well-lighted classrooms; however, harsh lights or reflections should not be allowed to focus directly on the screen area.

The engine should be set up on a work table or bench, anchored securely so that the engine will remain stationary if it is started.

An adequate ventilation system (from the engine's muffler to outside air) must be available to the student if he is carrying out the instructions indoors.

The DART Parts Locator with all tools in proper spaces must be set up within easy reach of the student. For maximum teaching effectiveness, the tools should be identical to those on the screen.

At the conclusion of this lesson the student will have completely disassembled his practice engine. Care must be taken to assure that all the parts and tools are available to the student when he reassembles the engine during the carry out of DART Unit 3002.

In this unit it is necessary for the student to turn the crankshaft by hand while the engine is in an inverted position. The student will receive an instruction to turn the crankshaft by using a wrench to turn a bolt in the end of the crankshaft. The bolt is a 3/8" National Fine Thread approximately one inch long and should be inserted into the crankshaft by the instructor prior to the student's taking this unit.

The unit should be cued and ready to start at the beginning of the lesson.*

---

*It is recommended and the instructor is encouraged to carry out each DART Unit prior to offering it to the student.

Materials

The instructional materials necessary for the student to successfully complete this unit are as follows:

DART Parts Locator (3000)
DART Tools Locator (3000)
Vertical shaft engine (Briggs and Stratton model 92902 type 0515)
Flywheel holder (Briggs and Stratton 19167)
Starter clutch wrench (Briggs and Stratton 19114)
Piston ring compressor (Briggs and Stratton 19070)
Piston ring compressor handle
Valve spring compressor (Briggs and Stratton 19063)
Torque wrench (Craftsman 9-44643)
Rachet (Craftsman 43785)
Socket extension (Craftsman 2-inch)
3/8 inch socket (Craftsman 43001)
7/16 inch socket (Craftsman 43002)
1/2 inch socket (Craftsman 43003)
13/16 inch deep well socket (Craftsman 4338) or 3/4 inch deep well depending on plug size
1/4 inch combination wrench (Craftsman 44699)
5/16 inch combination wrench (Craftsman 44691)
7/16 inch combination wrench (Craftsman 44694)
1/2 inch combination wrench (Craftsman 44695)
9/16 inch combination wrench (Craftsman 44696)
Screwdriver (Craftsman 41584 WF)
Pliers (Craftsman P45360)
Hammer (Craftsman 38292)
Oil Can (Craftsman 5580)
Feeler gauge (Craftsman 40804)
Brass shim stock (1" x 5" x .008)
Lintless paper (2" x 6")
Gas Can
Oil Can (one quart)
Funnel
Ink Marker (felt tip)
Engine stand (DART 3000)

Should you have difficulty obtaining materials or replacement items, contact Cardinal Associates.

Measurable Objectives

With an assembled Briggs and Stratton 92902 type 0515 engine before him, the student will be asked the following (the instructor observes the student to note correct and incorrect responses):

(1) Why should you never start an engine inside without venting the exhaust? (The fumes could cause illness or death).

(2) Tell me or show me how to start and stop an engine.

a. Move throttle level to "slow".

b. Pull cord.

c. Move lever to "stop".

(3) Point to the part that must be removed to drain the oil from the engine. (Oil drain plug)

(4) The spark plug is part of the ignition system. What does it do? (Ignites the gasoline mixture, or words to that effect).

(5) When removing the starter clutch, you need two special tools. Show me these tools. (Flywheel holder, starter clutch wrench).

(6) When the engine is running, what do the blades on the flywheel help do? (Cool the engine).

(7) Are the breakor points and condenser part of the fuel system or iginition system? (Ignition system).

(8) The JOURNAL is part of the crankshaft onto which the connecting rod fits. Point to the JOURNAL on this crankshaft.

(9) Why is this type of engine said to be "air-cooled?" (The flywheel blades blow air across the engine, which cools it.)

(10) The crankshaft and the camshaft work together in a special way. They must be in tune with each other. How can you tell if they are working together properly? (By checking to see if the timing marks are in line, or words to that effect.)

(11) After running the engine you should not touch the muffler because . . . . . (It may be hot.)

APPENDIX III

Achievement Scores

Adult Career Development Center, Fairbanks

California Achievement Test

Initial Reading Grade Level

	Reading Vocabulary	Reading Comprehension	Total Reading
A	3.4	4.3	3.2
B	3.8	5.0	4.0
C	3.4	6.3	4.9
D	4.0	6.3	5.2
E	5.0	5.8	5.3
F	8.5	8.3	8.5
G	7.8	9.9	9.1
H	8.5	9.5	9.1
I	9.0	9.5	9.4
J	11.3	8.1	9.5
K	10.7	11.4	11.1

One student refused to take the test. He did participate in using the *Basic Communications* series later in the semester.

Tanana State High School

Gilmore Oral Reading Test*

Student	Ken Cook Series Used	Program Time (Weeks)	Pre-Test	Post-Test
A	1	6	...	5
B	1	12	2-	3
C	1	12	2-	2
D	1	12	3	4
E	1	12	4	4
F	1	12	3	4
G	1	12	1	3
H	1,2	6	4-	...
I	2	2	5	...
J	3,4	18	7-	8
K	3,4	18	6-	7-
L	2	6	4	...
M	3,4	18	5	5
N	3,4	18	6	7
O	1,2	18	2	3

Eight (8) others used the machines but were not tested due to scheduling problems.

*Testing and results were provided by the teacher supervising the automated teaching system in Tanana.

APPENDIX IV

Interview and Daily Record Forms

1 52 blank

Teachers involved with the Automated Teaching System in Basic Communications should keep in mind the following when making the anecdotal remarks:

1. Does program do what it says? (Examples: vowels & double vowels -- Series 1, program 17 or explain the pay check, Series 3, program 9)
2. How well does it teach reading or basic communications in comparison to other methods? (Example: the program of remedial reading Tanana is now offering to students -- school students and adults in the community)
3. What else have the students learned of value? (Example: teaches skills of credit buying or about unfamiliar trades, such as the barber)
4. What areas or programs seem irrelevant to children in Tanana? (Example: Series 4, program 5 -- CLOTHING -- children and adults in Tanana dress for climate and practicality mainly jeans, few are interested in purchasing other than pants and shirts)

Some other things to be thinking about might include the following:

1. How much of your time (approximately) is used to explain the mechanics of the machines, reviewing the materials with the individual student, etc.
2. What have you found to be most frustrating in working with the programs and *Basic Communication* series?
3. What type of students seem to do well, do poorly with the teaching machine concept?
4. How are you using the programs; group mode, individual, pairs?

5. What other ways are you using the programs, such as diagnostically to strengthen areas of weakness in one area, introduce new materials in other classes like the checking account?

DATE _____

	STUDENT NAME	PROGRAM NUMBER	ANECDOTAL REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			

GRADE LEVEL ____ _____ NAME _____

INITIAL STUDENT REACTION

1. What previous experience or exposure have you had with the 10-key adding machine?

2. If you have had some previous experience, what do you know about it? Please write it down.

3. Student record:

Program number or name	Length of time to complete	Individual remarks on program

Teachers involved with the Automated Teaching Systems from Tomahawk Corporation should keep in mind the following when making the anecdotal remarks:

1. Does program do what it says? (Example: teach the student to open and manage a checking account.)
2. How well does it teach in comparison to other methods? (Example: teach proper tool use in Small Engine program)
3. What else have the students learned of value? (Example: following directions)
4. What areas or specific programs seem irrelevant to children in Nenana? (Example: cutting, threading, and reaming a pipe if no equipment is available to actually try how to do this.)

Some other things to be thinking about might include the following:

1. How much of your time (approximately) is used to explain the mechanics of the machines, reviewing the materials with the individual student, etc.
2. What have you found to be most frustrating in working with the programs?
3. What type of students seem to do well, or do poorly with the teaching machine concept?
4. How are you using the programs: group mode, individual, pairs?
5. What other ways are you using the programs, such as diagnostically to strengthen areas of weakness, introduce new materials in whole classes?

NAME _____

Student Interview

1. How often have you used the Basic Communications Programs?

2. In what areas do you think it helped you?

3. What specific programs did you use?

4. What difficulties are you having with the programs?

5. How do you like the teaching machines?

6. How do you like it compared to other teaching methods?

7. What changes in the specific programs could you suggest?

8. What general changes would you suggest?

9. What mechanical difficulties have occured when you worked with the machines?

10. How much time have you spent with the teaching machines?

11. In what areas did you need the teacher to help you?

Comments:

NAME _____

Teacher Interview

1. What is the curriculum offered?

2. How does the Basic Communications program fit into your curriculum?

3. How much of your time is involved with the system?

4. What is your feeling toward the teaching machine concept in general?

5. What seems to be the general response of the students to the programs?

6. How are you using the teaching machines?

7. Are you requiring each student to use the programs? If so, explain.

8. What types of students seem to do well with the program?

9. What type seem to do poorly?

10. What problems are you finding?

11. What changes could you suggest in general?

12. What changes could you suggest for specific programs?

Comments:

APPENDIX V

Individual Contracts and Weekly Evaluation

Prepared and Used by the Instructor in Tanana

HIGH SCHOOL INDIVIDUAL READING - CONTRACT

ACTIVITIES

1. Teaching machines, with tapes/slides/books. (Ken Cook Automated Teaching System)
2. Target Green Vocabulary Development Kit.
3. Clues Magazines/tapes.
4. Reading Progress Laboratory - Level 4
5. Fountain Valley materials - tapes/worksheets (Purple - Vocabulary
   Yellow - Vocabulary
   Blue - Reading Comprehension
   Orange - Phonics)
6. Better Reading Guidebooks (Stories, with exercises in books)

ASSIGNMENT

1. Do three weeks (3 weeks) of teaching machine activity, filling out workbooks daily, and evaluation sheet weekly.
2. Do one week (1 week) of each other activity listed, filling out daily exercises and weekly evaluation sheet.
3. Last week - select the one activity you liked best and do one more week of it. Fill out daily assignments, and weekly evaluation.
4. Complete pre and post tests in reading, as applicable.
5. Complete overall course/materials evaluation.
6. Fill in sign-out sheet every day. Any day you do <u>not</u> sign-out, you will be counted absent.

GRADES

A - All forms completed daily; present and on time, with no more than 2 absences or tardies (except in case of emergencies or serious illnesses).

B - All forms completed daily; no more than 4 absences or tardies. A good job must be done on the forms.

C - No more than 5 absences or tardies; forms must be legible and turned

in by at least the end of the week before you go home Friday night.

D - If forms are not turned in by Friday, or are incomplete. More than 5 absences or tardies.

F - Failure to turn in some of the forms ever (by end of the course). More than 7 absences or tardies, without prior arrangement with the teacher.

HIGH SCHOOL INDIVIDUAL READING - CONTINUED

CONTRACT

Week 1 - I will work on _____

Week 2 - _____

Week 3 - _____

Week 4 - _____

Week 5 - _____

Week 6 - _____

Week 7 - _____

Week 8 - _____

Week 9 - _____

I have read the assignments and the basis for earning grades. I have chosen the above listed assignments, and agree to work on them as indicated; I will accept grade assignment according to the terms stated.

Signed _____
Student

Signed _____
Teacher

Date _____

MY PROGRESS RECORD

WEEK	Day 1	Day 2	Day 3	Day 4	Day 5	Weekly Evaluation	Pre Test	Post Test	Overall Evaluation
1									
2									
3									
4									
5									
6									
7									
8									
9									

KEN COOK MACHINES

NAME: _____ DATE: _____

WEEKLY EVALUATION SHEET

NAME OF ACTIVITY YOU DID THIS WEEK: _____

Write your own answers. Be complete, THINK about it.

1. What did you learn from this week's activity? (Try to include at least 5 things.)

2. What did you think was the main purpose of the activity? (What did the writers want you to learn?)

3. What did you like about this activity, and tell why?

4. What did you dislike, and why?

5. Compare this week's activity with the others you have done in this class.

6. Who do you think should use this activity? (What age, type of person, and so on. . .?)

RATE THIS ACTIVITY:	Awful	Poor	Average	Good	Wonderful	Common
1. Teaches new vocabulary.			I	///// ///		
2. Is interesting to high school students.			///	/////		
3. Is easy to understand.			//	///// /	/	
4. Teaches other useful things besides how to read better.			///	///// /		
5. Teaches way to read/write better.			//	///// //		
6. Is easy to use.			/	///// ///		
7. Overall rating (grade) you'd give.			///	///// /		

COMPARISON PROJECT

Compared on:

1. Teaches new vocabulary

Reading Progress Lab	- 5 good
Fountain Valley	- 1 average
Ken Cook Materials	- 8 good, 1 average
Clues	- 1 average, 2 good, 1 wonderful

2. Interesting to high school students

Reading Progress Lab	- 5 good
Fountain Valley	- 1 average
Ken Cook Materials	- 3 average, 6 good
Clues	- 3 good, 1 wonderful

3. Easy to understand

Reading Progress	- 5 good
Fountain Valley	- 1 average
Ken Cook Materials	- 2 average, 6 good, 1 wonderful
Clues	- 4 good

4. Teaches other useful things besides reading

Reading Progress Lab	- 5 good
Fountain Valley	- 1 average
Ken Cook Materials	- 3 average, 6 good
Clues	- 4 good

5. Teaches to read/write better

Reading Progress	- 5 good
Fountain Valley	- 1 average
Ken Cook	- 2 average, 6 good
Clues	- 4 good

6. Easy to use

Reading Progress	- 5 good
Fountain Valley	- 1 average
Ken Cook Materials	- 1 average, 8 good
Clues	- 5 good

7. Overall Rating

Reading Progress Lab	- 5 good
Fountain Valley	- 1 average
Ken Cook Materials	- 3 average, 6 good
Clues	- 2 average, 2 wonderful

APPENDIX IV

Sponsor Comments on Evaluation

KEN COOK CO. TECHNICAL PUBLICATIONS • AUTOMATED TEACHING SYSTEMS

EXECUTIVE OFFICES AND MAIN PLANT
9929 WEST SILVER SPRING ROAD, MILWAUKEE, WISCONSIN 53225 PHONE (414) 466-6060 TELEX 26-825

REGIONAL OFFICES

July 11, 1974

Mrs. Diana Holzmueller
Assistant Educational Program Developer
Center for Northern Educational Research
University of Alaska
Fairbanks, Alaska 99701

Dear Diana:

Thank you for sending us the draft of your research on Basic Communications. We are very favorably impressed and want to commend you for a fine job. Your data looks good, and your evaluations are very fair.

We appreciate your criticisms which, hopefully, will be included in updated programs of the future. Some of the problems you mentioned have been brought to our attention already and have been averted in our recently produced programs. For example, you mentioned that the students had difficulty correlating the slides with the tapes. Our new programs have introduced numbered slides with an audio track which periodically reminds the student of the number of the slide he should be viewing.

The Mark Nine is in the process of undergoing some design changes; however, the changes do not include a remedy to the problems you mentioned. Rather, the major change will be in the tape deck and the way in which the tape will be inserted.

One point of interest was your comment about the audio being too slow. The first programs released had a faster audio, but the original testing revealed a high correlation between slow reading and slow listening. As a result of this discovery, the programs were recorded a second time at a slower speed. The first series is, however, designed for students with no competency in reading; whereas, your students came into the program with fifth and sixth grade reading ability. This difference could account for their loss of interest.

Again, Diana, thank you for doing an excellent job and for sharing your draft with us. If you wish, you may incorporate our comments in your second draft or even include this letter in your final report.

Sincerely,

Jeanne Godwin

Tomahawk corporation
P.O. BOX 171 • EDMONDS, WASHINGTON 98020
PHONE (206) 776-7598

July 9, 1974

University of Alaska
Center for Northern Educational Research
Fairbanks, Alaska 99701

Attention: Diana Holzmueller

Dear Diana:

I have reviewed your draft of "The Evaluation of Automated Teaching Systems" and would like to make the following comments.

1. I believe that the study indicates that the Cardinal Instructional Programs have a place in rural education in Alaska.

2. New programs are being introduced continually by Cardinal. A 2-cycle small engine program will be released by September, 1974, which would better suit the needs for rural Alaska. In addition, many new programs are presently being developed and should be released during the fall. I do not have a listing of these programs, but I have included the current listing of all programs available for immediate delivery.

3. The matter of equipment maintenance does not surprise me. I do not agree with your statement regarding equipment being able to stand up to high school use on a continuous basis. Generally speaking, we can train people to take care of the minor problems with the equipment so that most breakdowns can be corrected within hours. We have had few problems with projectors, and I am sure that some of the difficulties can be traced to the transportation.

4. We have just received an order from Nenana for the Small Engine Program and projector. I feel that this is proof that the instructor was quite satisfied with the results. I would like to further mention that the business programs probably didn't get as thorough an evaluation as I would have liked to have seen them receive.

5. It might be of interest to you to note that the State Operated Schools have ordered a number of the 2-Cycle and 4-Cycle Small Engine Programs from us.

I want to thank you for all of the help and assistance which you gave us in setting up the evaluation. We are quite encouraged by its results and would like to participate in any future evaluations.

Very truly yours,

W. D. Hamilton

W. D. Hamilton
President

WDH:lk

P.S - Would appreciate receiving the final copy of your report.